

Southeast Alaska Coastal Monitoring Project

JC-03-12 August Cruise Report

17 November 2003

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Scientists from the Marine Salmon Investigations Program at Auke Bay Laboratory, NOAA Fisheries, along with a collaborating JCFOS student conducted a 7-day cruise aboard the NOAA ship *John N. Cobb* in the marine waters of the northern region of southeastern Alaska 21-27 August 2003. This cruise completes a series of six Southeast Alaska Coastal Monitoring (SECM) Project cruises scheduled for 2003.

The SECM project was initiated in 1997 to study the habitat and early marine ecology of juvenile Pacific salmon (*Oncorhynchus* spp) in inshore, strait, and coastal habitats along a primary seaward migration corridor. These habitats span 250 km from near Juneau, westward through Icy Strait to 64 km offshore in the Gulf of Alaska. Objectives for these cruises were to: 1) collect biological data on juvenile Pacific salmon and other pelagic fish species from surface rope trawl samples, and 2) monitor physical and biological oceanographic indices seasonally at sampling stations in inside, strait, and offshore habitats of juvenile salmon.

Sampling in 2003 marks the seventh year of the SECM long-term study on how the intra- and inter-annual variability of physical and biological oceanographic indices relate to the distribution, abundance, growth, and survival of salmon and other fish populations at the same localities. The information collected will also provide insight into potential effects of climate change on stock-specific growth and recruitment of salmonids, interactions between hatchery and wild stocks of juvenile salmon, and the utilization of marine habitat by key fish species.

METHODS

Thirteen stations were scheduled for sampling during the 21-27 August 2003 cruise (Table 1, Figure 1). Stations were located in Auke Bay and along two transects with four stations each in Upper Chatham Strait and Icy Strait and four stations along the Icy Point transect in the Gulf of Alaska. Oceanographic measurements were planned for all stations and trawling was planned for all stations except Auke Bay Monitor. Rope trawl samples were replicated at all previously

trawled stations with minimal accompanying oceanographic sampling.

Oceanographic sampling:

The physical and biological environment was monitored throughout the cruise. To examine horizontal water structure, temperature and salinity readings were continuously logged at 1-minute intervals from 2-m depth using a SeaBird SBE-21¹ thermosalinograph. To examine vertical water structure, a Seabird SBE-19 conductivity-temperature-depth (CTD) profiler was deployed at each station to 200 m or within 10 m of the bottom, dependent upon depth. Surface water samples were taken at each station for later determination of chlorophyll and nutrient content.

Zooplankton was sampled at each station using conical nets hauled vertically and a bongo net system hauled obliquely. At each station, vertical plankton hauls were taken from a depth of 20 m using a 50-cm frame and 243-micron mesh (NORPAC) net. At Auke Bay, and at stations along the Icy Strait and Icy Point transects, vertical hauls were taken from a depth of 200 m or within 20 m of the bottom using a 57-cm frame and 202-micron mesh (WP-2) net, and one double oblique bongo haul was taken from 200 m or within 20 m of the bottom using a 60-cm frame with 505- and 333-micron mesh nets. To determine the volume of water sampled, a Roshiga flow meter was used inside the vertical net frames and a General Oceanics flow meter was used inside the bongo net frames. A Bendix/Marine Advisors Model T-1 Bathykymograph time depth recorder was used with the bongo nets to validate the maximum deployment depth of each haul. During replicate hauls, plankton was sampled with a NORPAC net only.

Trawl Sampling:

A Nordic 264 rope trawl fished, at the surface, directly astern the *John N. Cobb* was used to sample fish. The mouth opening of the trawl was approximately 20 m deep and 24 m wide, spread by a pair of 3-m Lite trawl doors. The trawl was fished fully open with 150 m of main warp out for a duration of 20 minutes at a speed of about 1.0-1.5 m/sec (2-3 knots). To fish the headrope of the trawl at the surface, a cluster of three meshed A-4 Polyform buoys was tethered to each wing tip of the headrope and one A-3 Polyform float was clipped onto the center of the headrope. Mesh sizes ranged from 162.6 cm in the throat of the trawl near the jib lines to 8.9 cm in the cod end. A 6.1 m long, 0.8 cm knotless liner was sewn into the cod end. Along the jib lines on the top panel of the trawl, between the head rope and the first 162.6-cm mesh, a small mesh panel of 10.2-cm mesh was incorporated to minimize the loss of fish aft of the headrope.

After each haul, the fish caught were anaesthetized with tricaine methanesulfonate, identified, enumerated, measured, and stomachs sampled (if appropriate). Fish were measured to the nearest mm fork length (FL) with a Limnoterra FMB IV electronic measuring board. The heads of all chinook (*O. tshawytscha*) and coho (*O. kisutch*) salmon lacking adipose fins were retained

¹Reference to trade names does not imply endorsement by the NOAA Fisheries.

for the possible recovery of coded-wire tags (CWTs). Stomachs from potential predators of juvenile salmon were excised, weighed, and classified by fullness. Stomach contents were removed and identified to a practical level and estimated to the nearest 10% of total volume. The weight of the stomach contents was determined as the weight of the stomach and contents minus the weight of the empty stomach.

Laboratory processing:

Data on settled volumes (SVs, ml) of zooplankton in the 20-m vertical hauls and from decoded CWTs of fish lacking adipose fins are included in this report. Laboratory processing still in progress includes 1) measurement of weight and condition of juvenile salmon; 2) determination of energetic content from frozen samples of juvenile pink, chum, and coho salmon; 3) examination for otolith thermal marks in frozen samples of juvenile chum, sockeye, coho, and chinook salmon; 4) scale samples of each species of juvenile salmon; 5) measurement of plankton displacement volumes of all bongo net samples; and 6) microscopic analysis zooplankton species composition and abundance estimation from all NORPAC and bongo net samples taken at the Icy Strait stations. These data will be reported in an annual North Pacific Anadromous Fish Commission document.

RESULTS and DISCUSSION

Severe mechanical problems with the main engine clutch of the NOAA ship *John N. Cobb* resulted in a loss of nearly five of the seven days scheduled for the cruise. Consequently, only nine stations were sampled, four only partially (Table 1). Standard oceanographic sampling and surface trawling were conducted according to the following schedule:

Day 1: Auke Bay (1 station) and Upper Chatham Strait transect (4 stations)
Day 2: Icy Strait transect (4 stations)
Day 3: Transit to Juneau NMFS Subport due to mechanical problems
Day 4: Cancelled due to mechanical problems
Day 5: “ ”
Day 6: “ ”
Day 7: Cancelled due to mechanical problems

A total of 9 CTD casts, 11 NORPAC hauls, 12 bongo hauls, and 5 WP-2 hauls were made during the cruise (Table 2). Nine surface water samples were also taken at the nine stations for later analysis of chlorophyll and nutrients.

Surface (2-m) temperatures and salinities ranged from 10.8 to 13.1°C and 18.5 to 29.6 PSU (Table 3). Salinities followed the spatial pattern observed in previous cruises, lowest at the ABM station and increasing toward the Gulf of Alaska. Temperatures were the lowest in the

southernmost station in Icy Strait (ISA) and highest at the northernmost station in Icy Strait (ISD).

Zooplankton biomass, as determined from the SVs of the NORPAC samples, ranged from 2 to 9.5 ml, with the highest SVs found at the northernmost station in Icy Strait (Table 3). Highest SVs of phytoplankton were only determined from the triplicate NORPAC samples collected at the ABM station (18, 18, and 17 ml), indicating a secondary phytoplankton bloom.

A total of 30 fish were collected from 4 rope trawl hauls (Tables 3, 4, and 5). Juvenile coho salmon were the most abundant and frequently occurring taxon, with catches from 2 to 7 fish per each haul. For non-salmonids, crested sculpin (*Blepsias bilobus*) occurred most frequently, with 5 fish total in three of the four hauls.

One juvenile coho salmon lacking the adipose fin was caught and it contained a CWT. The fish originated from Auke Creek, some 65 km away, and migrated at a rate of 1.1 km/d over 65 days from 25 June until 21 August (Table 5).

ACKNOWLEDGMENTS

We acknowledge and compliment the command and crew of the NOAA ship *John N. Cobb* for their cooperation and performance during the cruise. We also thank Mike Kubota, a contract employee, for assistance on the cruise.

Table 1.--Localities and coordinates of stations scheduled for oceanographic sampling in the marine waters of the northern region of southeastern Alaska off the NOAA ship *John N. Cobb*, 21-27 August 2003. Distance between refers to adjacent stations in a transect locality.

Locality	Station	Latitude North	Longitude West	Distance		Depth m
				offshore km	between km	
Auke Bay	ABM	58° 22.00'	134° 40.00'	1.5	—	60
Upper Chatham Strait	UCA	58° 04.57'	135° 00.08'	3.2	—	400
	UCB	58° 06.22'	135° 00.91'	6.4	3.2	100
	UCC	58° 07.95'	135° 01.69'	6.4	3.2	100
	UCD	58° 09.64'	135° 02.52'	3.2	3.2	200
Icy Strait	ISA	58° 13.25'	135° 31.76'	3.2	—	128
	ISB	58° 14.22'	135° 29.26'	6.4	3.2	200
	ISC	58° 15.28'	135° 26.65'	6.4	3.2	200
	ISD	58° 16.38'	135° 23.98'	3.2	3.2	234
Icy Point	IPA	58° 20.12'	137°07.16'	6.9	—	160
	IPB	58° 12.71'	137°16.96'	23.4	16.8	130
	IPC	58° 05.28'	137°26.75'	40.2	16.8	150
	IPD	57° 53.50'	137°42.60'	65.0	24.8	1,300

Table 2.—Number of oceanographic and biological samples collected in the marine waters of the northern region of southeastern Alaska using the NOAA ship *John N. Cobb*, 21-22 August 2003.

Date	Time	Haul#	Station	CTD	Plankton net samples			Chlorophyll & nutrients	Rope trawl
					NORPAC	Bongo	WP-2		
21 August	1040	7101	ABM	1	3	4	1	1	0
21 August	1425	7102	UCD	1	1	0	0	1	1
21 August	1550	7103	UCC	1	1	2	0	1	1
21 August	1802	7104	UCB	1	1	0	0	1	1
21 August	1931	7105	UCA	1	1	0	0	1	1
22 August	1430	7106	ISA	1	1	4	1	1	0
22 August	1232	7107	ISB	1	1	4	1	1	0
22 August	1430	7108	ISC	1	1	6	1	1	0
22 August	1620	7109	ISD	1	1	4	1	1	0
Total				9	11	24	4	9	4

Table 3.—Two meter depth temperatures and salinities, 20-m vertical NORPAC plankton settled volumes (SVs), and number of salmon caught in rope trawl hauls from the NOAA ship *John N. Cobb* at stations in marine waters of the northern region of southeastern Alaska, 21-22 August 2003.

Date	Haul#	Station	Temp. (°C)	Salinity (PSU)	Plankton SVs (ml)			Juvenile salmon			Adult Pink	Crested sculpin	Prowfish
					Zoop-	Phyto-	Total	Pink	Sockeye	Coho			
21 August	7101	ABM ²	11.1	18.5	3.7 ²	17.7 ²	21.3 ²	—	—	—	—	—	—
21 August	7102	UCD	12.5	25.0	4.0	0.0	4.0	1	0	2	0	1	0
21 August	7103	UCC	12.5	25.0	8.0	0.0	9.0	1	0	6	1	2	1
21 August	7104	UCB	12.4	28.9	3.0	0.0	3.0	0	0	4	0	0	0
21 August	7105	UCA	11.4	29.6	2.0	0.0	2.0	0	1	7	1	2	0
22 August	7106	ISA	10.8	29.3	5.0	0.0	5.0	—	—	—	—	—	—
22 August	7107	ISB	11.9	26.9	4.0	0.0	4.0	—	—	—	—	—	—
22 August	7108	ISC	12.2	25.6	6.0	0.0	6.0	—	—	—	—	—	—
22 August	7109	ISD	13.1	25.0	9.5	0.0	9.5	—	—	—	—	—	—
Total catch								2	1	19	2	5	1

²NORPAC SVs are averaged from three hauls, SVs from one WP-2 net were 2.0 ml zooplankton and 76.0 ml phytoplankton.

Table 4.—Length, percent frequency of occurrence (FO), and life history stage of fish caught in 4 rope trawl hauls from the NOAA ship *John N. Cobb* in the marine waters of the northern region of southeastern Alaska, 21-22 August 2003.

Common name	Species	n	Fork length (mm)			%FO	Life ³ history stage
			min	max	\bar{x}		
Coho salmon	<i>Oncorhynchus kisutch</i>	19	194	268	234.3	77	J
Pink salmon	<i>O. gorbuscha</i>	2	165	192	178.5	69	J
Sockeye salmon	<i>O. nerka</i>	1	253	253	253.0	46	J
Pink salmon	<i>O. gorbuscha</i>	2	505	530	517.5	35	A
Total salmonids captured and measured		24	—	—	—	—	—
Crested sculpin	<i>Blepsias bilobus</i>	5	132	145	138.8	75	I-A
Prowfish	<i>Zaprora silenus</i>	1	111	111	111.0	25	I-A
Total non-salmonids captured		6	—	—	—	—	—
Total fish and squid captured		30	—	—	—	—	—

³J=juvenile or post larvae in first year at sea (i.e. age-.0), I=immature age-.1 or older in pre-spawn condition, and A=mature adult or near age of maturity.

Table 5.—Release and recovery information for salmon lacking the adipose fin or coded-wire tagged caught in rope trawl hauls from the NOAA ship *John N. Cobb* in the northern region of southeastern Alaska, 21-22 August 2003.

Species	Release information						Recovery information						Days since release	Marine distance traveled	
	Coded-wire tag code	Brood year	Agency ³	Locality	Date	Size		Locality (station code)	Date	Size		Age ⁴			
						mm	g			mm	g				
Coho	04:08/01	2000	ADFG	Auke Creek, AK	6/25/03	107	13.0	Chatham St. (UCA) Haul#7105 Fish#1	8/21/03	234	160.2	1.0	57	65	1.1

³ADFG=Alaska Department of Fish and Game.

⁴European age notation, with the numeral before the decimal denoting the number of freshwater winters and the numeral following the decimal denoting marine winters.

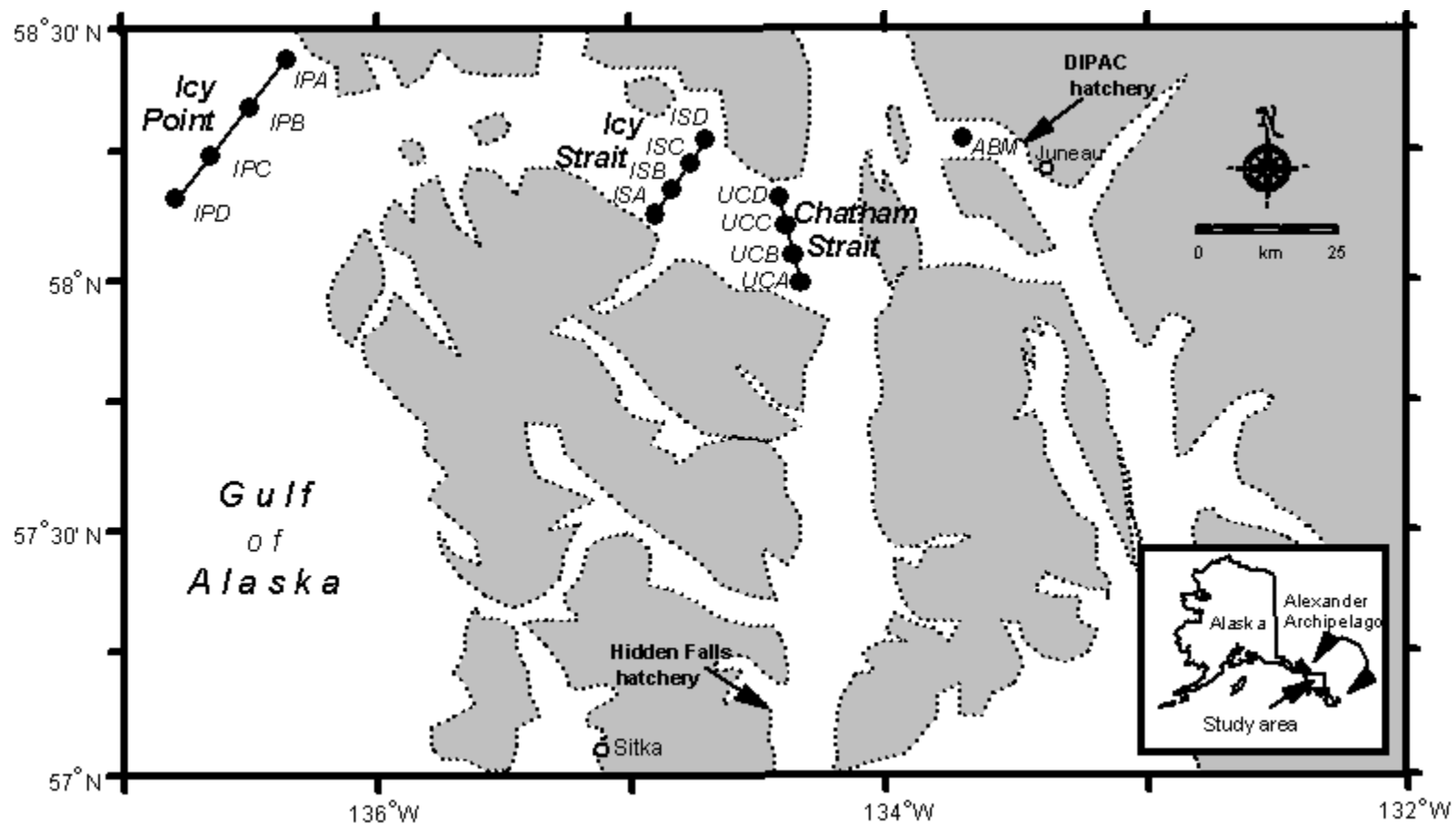


figure 1.—Thirteen stations planned for sampling in the marine waters of the northern region of southeastern Alaska from the NOAA ship *John N. Cobb*, 21-22 August 2003.